STUDY PROJECT

DESERT SHIELD/STORM LOGISTICS

BY

LIEUTENANT COLONEL MITCHELL H. STEVENSON
United States Army

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Operation DESERT STORM was a significant accomplishment for the United States Army. A key component of that accomplishment was that the logistics was, for the most part, where it was needed, when it was needed, and was generally executed in accordance with current logistics doctrine. However, doctrine doesn't tell the logistician everything that he or she needs to know, particularly if that logistician is supporting the initial forces deployed into the theater of operations. The United States Army has become, more so than ever before in its history, a "power projection force." Its logisticians need to understand the finer points of support for a key component of the initial entry force, the division.

As part of the overall historical effort to capture what had occurred during Operations DESERT SHIELD and STORM, the commanders of the Division Support Command of the 24th Infantry Division (Mechanized) held a full day of discussion centering on what occurred during Operation DESERT STORM and its preceding operation, DESERT SHIELD. The entire discussion was videotaped at the US Army War College in December 1992, under the auspices of Dr. Douglas Johnson, USAWC Strategic Studies Institute. The author of this paper, a participant in that discussion, then edited the nearly nine hours of videotape that resulted down to approximately two and a half hours of tape that focuses primarily on lessons learned by the logisticians supporting the operation.

The purpose this edited tape is to provide a <u>training product</u>, one that can be used by future commanders of division-level logistics units, as well as by logistics planners at echelons above division (eg. Headquarters, Department of the Army, on joint staffs, etc.) or by writers of doctrine and/or creators of unit authorization documents in the US Army Training and Doctrine Command. In that regard, a topical outline of the topics discussed in the tape is provided at Appendix III to this paper, which lists each of the topics contained in the tape, organized into seven broad phases, along with the approximate run time in the edited videotape for each of these seven phases. This main body of this paper is a synopsis [illegible] should be read in conjunction with viewing it.

USAWC MILITARY STUDIES PROGRAM PAPER

DESERT SHIELD/STORM LOGISTICS

AN INDIVIDUAL STUDY PROJECT

by

Lieutenant Colonel Mitchell H. Stevenson
United States Army

Dr. Douglas V. Johnson
Project Advisor

U. S. Army War College
Carlisle Barracks, Pennsylvania 17013

Abstract

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Operation DESERT STORM was a significant accomplishment for the United States Army. A key component of that accomplishment was that the logistics was, for the most part, where it was needed, when it was needed, and was generally executed in accordance with current logistics doctrine. However, doctrine doesn't tell the logistician everything that he or she needs to know, particularly if that logistician is supporting the initial forces deployed into the theater of operations. The United States Army has become, more so than ever before in its history, a "power projection force." Its logisticians need to understand the finer points of support for a key component of the initial entry force, the division.

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DESERT SHIELD/STORM LOGISTICS

The purpose of this paper is to synopsize, and in some cases further develop, the key points in the accompanying videotape. The videotape is a compilation of key points made during a panel discussion with the commanders of the 24th Infantry Division (Mechanized) Support Command (less the commander of the 197th Support Battalion, who was not able to participate) about the lessons learned in logistics operations and requirements during operations DESERT SHIELD and DESERT STORM, 7 August 1990 - 14 April 1991. The panel discussion, and therefore this paper, is not an all-exclusive listing of lessons learned during operations DESERT SHIELD and DESERT STORM; rather, it is the capturing of key thoughts that each of these commanders retained about the experience. Furthermore, neither the videotape nor this paper is intended to be a "history" of the operation (in fact, purely historical discussion has been edited out). Together, this paper and the videotape are intended to be used as vehicles for capturing logistics lessons learned for the force projection force. It will not only be valuable to division-level logisticians as a thought-provoking collection of commanders' perspectives of the challenge; it should also prove a valuable piece for logisticians at all levels above division, in terms of the implications of actions they take or do not take, and in terms of the functionality of the doctrine that has been established.

The participants in the discussion (as they appear at the beginning of the videotape, fr... top left to right) are Dr. Douglas V. Johnson (LTC, US Army, retired), US Army ... College Strategic Studies Institute, Colonel James C. King, commander of the 24th Infantry Division Support Command (DISCOM), LTC Tommy Roberson, chief of the Division Materiel Management Center, LTC Jay Erb, commander of the 24th Forward Support

Battalion (in support of the division's 1st Brigade), LTC Terry Clayton, commander of the 224th Forward Support Battalion (in support of the division's 2nd Brigade), and LTC Mitchell H. Stevenson, commander of the 724th Main Support Battalion.

The 24th Division was alerted for deployment on 7 August and its last soldiers left Saudi Arabia in redeployment back to Fort Stewart, Georgia on 14 April 1991. The discussion of this period is broken down in the videotape into seven discussion areas: Alert/Pre-deployment, Strategic Deployment, Movement to Initial Positions, Build-Up and Preparation for the Defense, Movement to Pre-Attack Assembly Areas & Preparation for the Attack, Desert Storm Operations, and Retrograde, Consolidation & Redeployment. More time is devoted to earlier phases due to the proportion of time spent in them, and the fact that most lessons learned came in the early phases of the operation.

Alert/Pre-deployment

Perhaps the most significant thing about this phase of the operation was the fact that initially, it was thought that the 24th Division would be sending only a reinforced brigade (2nd Brigade) to Southwest Asia (SWA). Consequently, a support slice from the main support battalion (MSB) and the Division Materiel Management Center (DMMC) was developed to augment the (224th) forward support battalion (FSB); in fact, this slice eventually deployed with (ie. on the same ships as) the 2nd Brigade and the 224th FSB. Since deployment of the 2nd Brigade to SWA would put the FSB in a position where it would have to operate almost completely on its own, similar to what is required when a brigade from the division deploys to the National Training Center (NTC) at Fort Irwin,

California, the support slice from the MSB and DMMC likewise had to be similar to those that were sent to the NTC. The MSB and DMMC had trained to deploy in such a manner - - they did it during every NTC rotation for each brigade in the division. Moreover, this creation of a self-sustaining slice of the MSB/DMMC (complete with command and control) is ideal in the event something unexpected happens, and the remainder of the MSB/DMMC is delayed or destroyed (which is exactly what happened when the USNS ANTARES, the fast sealift ship on which most of the MSB's and DMMC's equipment was loaded, broke down at sea and had to be towed to Rota, Spain, where its cargo was transloaded onto another ship, eventually arriving in country three weeks later than expected). The old lesson of not putting all of one's eggs in one basket is just as applicable to support units as to any.

As might be expected, the pre-deployment period was quite stressful. Everyone in the DISCOM quickly came to the realization that, while they were well trained in their support mission, they had never actually deployed the entirety of their units before. In addition, the timing of the deployment could hardly have been worse - a brigade (including the FSB and MSB/DMMC slice) had just returned from the NTC, but as of 7 August, their equipment had not; a tank battalion was in the midst of a COHORT deployment to Korea, with only a skeleton of its leadership left as of 7 August; fiscal constraints of the end of the fiscal year had resulted in decisions to not replenish unit PLLs; etc. However, there are probably few times during the year when complicating factors such as these would not have played a role, and so the lesson is, as it has been so many times in the past, that deployments/wars often happen when they are least expected. Though many of the aspects of the division's emergency deployment operations plan had never before been fully tested in a complete deployment

such as this, it remained nonetheless a useful document that focused initial actions.

Deployability was a topic that consumed a considerable amount of leadership attention. Some non-deployability is always to be expected, if for no other reason than the fact that some percentage of the female population will either be pregnant, or in a post-partum leave status, and that some percentage of all soldiers will be temporarily non-deployable due to illness or injury. Perhaps the lessons regarding deployability can best be summed up by noting that deployability is a basic requirement of soldiering, just like being able to qualify with one's individual weapon, or being able to don a protective mask within the required time. Commanders at all levels would do well to insist that no soldier be permitted to remain on active duty who is permanently non-deployable. When the time comes, and the country calls, there will always be some percentage of the force (probably at least 5%) that cannot deploy with their unit for very good and acceptable reasons. Nothing can be done about that, and the consequent effect it will have on unit cohesion and effectiveness as replacements are received during the deployment process. However, it is crucial that commanders not exacerbate this problem by allowing themselves to be surprised as to other soldiers' non-deployability.

Other significant lessons discussed in the videotape for this phase are:

1) Alcohol was put off-limits as soon as the alert was called. Given that the soldiers of the DISCOM were all working extended hours, and that an "off-duty" period could not be defined or predicted, this helped preserve the effectiveness of force, 24 hours a day.

2) Many professional fillers (PROFIS) were not prepared to deploy and operate with the medical company to which they were aligned DESERT SHIELD afforded the time to

overcome this deficiency; however, given that after action reports from previous major deployment exercises often cited this same recurring problem, there was no excuse for having had to learn this lesson again.

3) An obscure mission (especially in peacetime), but nonetheless a very important one, is the management, receipt, storage and issue of maps. Unfortunately, the DISCOM is not prepared in its training, nor equipped (eg. with map storage vans), to execute this mission effectively. In large scale offensive operations with mechanized units, the volume and types of maps needing to be dealt with will always be large. This deficiency must be overcome.

4) DISCOM logisticians were unable to take advantage of the multiplier to deployability that use of 20' MILVANs provides. This was partially due to inexperience, but mostly due to the fact that the division had very few MILVANs on hand at the time of the alert; by the time the division G-4 was able to obtain some, much of the opportunity to use them had effectively been lost. In order for MILVANs to be a deployment multiplier, they must be in the hands of the deploying unit before the alert is called. More on the use of 20' MILVANs will be provided later in this paper.

5) An understanding of the availability and use of "operational project stocks" may be lacking in our doctrine.[1]

6) The act of deployment makes support units unable to provide support effectively. Early on in their deployment cycle, they need to be relieved of their support mission responsibilities. The installation assumes an enormous workload in the process of deploying the division.

7) Communications were very important during this phase, and were improved through

the use of rented equipment (since TOE equipment had been shipped) and twice daily updates at the Division HQ (to which LTC commanders and above were invited).

8) The decision to consolidate all those who do not deploy into provisional units leaves family support groups without an Army organization to turn to with which they are familiar.

9) The fact that we do not train in peacetime with all equipment and supplies that we would carry in wartime (eg. ammunition, etc.) masks the true mobility of units.

10) DISCOM units left all supplies at Fort Stewart that could not be uploaded on trucks/trailers. Other than loading these supplies into MILVANs (which weren't on hand until the last minute), there is really no other provision for shipping "loose" supplies aboard ships.

11) The desire of the entire Army institution to ensure that the 24th Division, the "first-to-fight" division, had everything (especially shortages in authorized equipment that were on backorder) that could possibly be made available resulted in a phenomenal amount of supplies and equipment flowing into Fort Stewart in the three weeks before the main body finally departed, often after the ship of the unit for whom it was designated had already been loaded and departed. Installation supply activities need well thought out plans to receive this enormous volume of inbound cargo, and to forward it as appropriate.

12) In the interim between when the heavy division's ships are loaded and soldiers depart by air, when last minute training requirements are most urgent (if for no other reason than busy hands are happy hands), there is no equipment left on which to conduct that training.

13) Deployment of contracting specialists in the advance elements of the division is an excellent way of making up for shortfalls in assets or echelons above division (EAD) units.

Of course, this will not be as productive in austere target areas such as Somalia; nonetheless, it is certainly worthy of consideration as doctrine for force projection support operations.

Strategic Deployment

The 24th Infantry Division (Mechanized) deployed to SWA in ten ships (seven fast sealift and three RORO - see Appendix I). This is contrary to the eight fast sealift ships that are advertised to deploy a heavy division.[2] Given that the division deployed with only nine maneuver battalions (its tenth battalion was an armor battalion of the South Carolina National Guard) and only one attack helicopter battalion, it is clear that it will take more than eight fast sealift ships to deploy a heavy division. Although the division had trained to deploy parts of the division to SWA (Operation Bright Star, Operation Display Determination, etc.), this was its first time deploying the entire division; nonetheless, it had a 10,000+ soldier force deployed and in the field within 30 days,[3] which lends credence to the conclusions of the Mobility Requirements Study, which asserts that (given enough ships) two heavy divisions can deploy to SWA within 30 days.[4] As a final point regarding ship movement, it should be noted that the 24th Division transported all vehicles with ammunition basic loads fully uploaded, all fuelers fully uploaded with fuel, Stinger air defense teams on each ship for protection from air attack enroute, and 100 soldiers aboard each ship, all without incident (despite being told initially that none of these things were allowable).

The division achieved moderate success with LOGMARS marking of equipment, its administrative unit equipment listings (AUEL) and TC-ACCIS (the management information system used with these). In the final analysis, they worked because there was an ability to

make last minute corrections of LOGMARS labels and update the AUEL at the port, though the high volume of these last minute corrections played havoc with TRANSCOM's ability to predict how much square footage of ship cargo space would be required to completely deploy the division. The lesson here appears to be that the easier it is for units to check/keep their AUELs up-to-date, and the sooner they permanently affix LOGMARS labels on their equipment, the more accurate will be the AUELs, and the predictor of sealift required for any given size unit.

Other significant lessons discussed in the videotape for this phase are:

1) The technique of super-hydration (requiring all soldiers to drink one gallon of water on the aircraft enroute to SWA) works, and helped reduce heat casualties in the initial phases of DESERT SHIELD. In addition, leaders must be reminded to eat regularly, else they will make themselves more susceptible to becoming casualties.

2) Tying down equipment on ships usually involves a requirement for more tie-down shackles than units have and will probably result in damage to some percentage of vehicle/trailer tires. Furthermore, using slings to offload full fuel tankers can cause serious damage to these vehicles/trailers.

3) Biggest initial problems were lack of communications gear, and lack of command and control vehicles. Hand-held receiver-transmitters were invaluable. This is an especially acute problem for the DISCOM, since it is the obvious candidate to be the port support activity (to orchestrate the off-loading of the division's ships at the port of debarkation), as well as a whole host of other deployment support activities at a multitude of locations.

4) Hand-carrying computers and medical sets needs to be made doctrine. Logistics units

cannot function very effectively without computers, and medical personnel need medical equipment/supplies immediately upon arrival at the destination (even before the ships are unloaded). Hand-carrying both is easily accommodated.

Movement to Initial Positions

It was during this phase that the DISCOM began to experience for the first time the effect of not having any EAD units in country. Doctrinally, divisions have their supplies delivered to them - - technically, they are not required to go get anything. This doctrine is reflected in the organization of DISCOM support units (ie. if they were expected to go get their supplies, they would have been authorized more transportation assets, etc.). However, given the sequence in which the contingency corps will deploy (probably not much different than it did on OPERATION DESERT SHIELD), there will always be some time (probably up to 60 days or even longer) before EAD support units arrive in country. Since it is probably unlikely that there will ever be sufficient strategic lift or SPOE port capacity for EAD units to deploy simultaneously with DISCOMs, DISCOMs must learn how to be able to operate independently in the initial phases of an operation. This mandates a deliberate strategy as to the order in which the DISCOM deploys (for both units and equipment within those units), a correct mindset on the part of the commanders, etc. Especially critical is who is selected to be in unit and headquarters element advance parties.

It is significant to note that each of the commanders of the 24th Infantry Division DISCOM had experience deploying to and operating at the NTC, and/or on REFORGER. Just as this experience was invaluable to the ability of combat forces to maneuver and win

against the enemy, so too was it invaluable for combat service support units. Since the NTC focuses only at the brigade level and below, and REFORGERs past often were multiple-brigade operations, a REFORGER-like experience was especially valuable for the MSB commander, who has to be able to envision the challenges of supporting an entire division deployed to the field. *Unfortunately, the scaling back of REFORGER to a command post type exercise, using mostly computer simulation, will deprive future logistics commanders of that experience.*

Also during this phase, the DISCOM had to relocate the division support area (DSA) for the first time (it would eventually relocate a total of seven times during the campaign). Not much is written in doctrine about the technique of doing this, especially given that the MSB is designed to be only 50% mobile (ie. about half as many trucks needed to relocate the MSB are authorized in it). Fundamentally, it is done by echeloning, always ensuring that either the eventual destination or the origin are capable of meeting mission requirements. Another lesson learned is that, in offensive operations, it is always possible to leave behind a "cache" of supplies (and even equipment) that is not anticipated to be required during the course of the operation, or at least in the early stages of the operation, under the control of a small detachment from the unit.

Other significant lessons discussed in the videotape for this phase are:

1) MILVANs are very useful in the act of deployment; they are even more useful in resupply of the division (especially considering that the commercial shipping industry is becoming increasingly containerized - - currently, over 70% and growing[5]). However, they are extremely difficult to move without a Rough Terrain Container Handler (RTCH), an item

of equipment the division is not authorized.

2) Operations in SWA during the summer months require leaders to take extraordinary actions (ie. convoy movement only at night, to keep tires from overheating and failing prematurely due to extreme heat; work schedules that have soldiers sleeping during the hottest times of the day, and working at night; etc.).

3) The lack of EAD units in theater was alleviated by contracting for the delivery of fuel to the DSA in civilian tanker trucks. However, the plumbing on these civilian tanker trucks was such that military fuel hose couplings could not hook up to them. This interface problem was substantial, and not overcome until interface adapters were found and procured (they were not immediately available in country).

Build-Up and Preparation for the Defense

As might be expected in an operation in SWA, water resupply was a significant logistics challenge. Most important is the fact that the DISCOM is authorized a water production capability, with virtually no capability for distribution. This implies that units throughout the division will go to the water production source. However, unit water carrying capacity is barely adequate (usually one 400 gallon water trailer per company-sized unit). This problem was exacerbated in SWA by the fact that sources of raw water for purification were extremely limited. Essentially, raw water sources consisted of either sea water, or water from existing wells (the division has no well-digging capacity; furthermore, well-digging usually takes weeks, not days). The DISCOM solved this problem by renting twenty-seven 6,600 gallon capacity water tankers (and the prime movers to go with them), using them to

transport water to unit distribution points from existing wells in the division area (where all the division's water purification units were consolidated to bring this well water up to US medical standards). That this number of water tankers was barely adequate is testimony to the poor quality of the tankers provided. Experience would indicate that anything less than ten 5,000 gallon tanker equivalents would be insufficient for a heavy division operating in SWA (this number would require supplementing if the tactical situation permitted establishment of unit showers, or if chemical defense operations were anticipated, both with a consequent need for larger quantities of water). As a final comment about water, the ten reverse osmosis water purification units authorized in the division are inadequate (at 120,000 gallons production/day) to meet the needs of a heavy division operating in SWA. Bottled water significantly eased both the production problem and the distribution problem, in that it required no purification and could be transported on cargo trucks; however, use of bottled water to meet the drinking needs of the division meant an average daily handling requirement for 5,000 cases of bottled water/day, and brought with it a whole host of additional problems.

Since most units of the division operated from assembly areas during this phase, where the entire unit was kept together, the FSBs experienced a unique challenge. Doctrinally, maneuver unit field trains co-locate with the FSB, and take part in the operations (eg. security) of the brigade support area (BSA). This arrangement has many attractive features to it, not the least of which is ease in communications between maneuver unit support personnel and FSB personnel. Furthermore, FSBs are organized by TOE with the expectation that they will normally be collocated with the field trains of the brigade. However,

throughout the DESERT SHIELD phase, and even in the initial (pre-attack positioning) phase of DESERT STORM, FSBs had to learn to operate with none of the units around them that they would normally have.

Viewing the videotape, there will be a temptation to criticize decisions made during the deployment phase (failure to bring tents/stoves, a battalion commander's decision that no soldiers would bring sleeping bags, etc.). However, it must be kept in mind that each of these decisions were made by competent commanders with what, to them, was sound rationale at the time. Lumber for overhead cover in fighting positions was an item much higher in the priority of supplies to fit in precious cargo space than most other things. Truck authorizations being somewhat austere, most units could provide sound argument that they just don't have enough trucks to carry all that they need. Support units were attempting to deploy with all manner of supplies and equipment, and had to prioritize what would be loaded into the limited cargo space available. Maneuver units had every reason to expect that they would have to fight their way out of the port of Dammam. No one had envisioned the scenario that actually occurred (ie. a six month buildup/wait in the desert). Furthermore, experience at the NTC had taught maneuver units that tents, cots and other amenities were inappropriate to maneuver warfare in the desert - - only tactical operations centers and command posts used them; everyone else lived out of their combat vehicles. Without a clear vision as to how the operation will unfold, which will oftentimes be impossible, this same sort of problem will likely occur in the next deployment, and the logistics system will have to be prepared to supply these things to the deployed force after they have reached their destination. One could even make the argument that our force projection units shouldn't be

thinking about comfort-type items in their deployment, and rather should concentrate on deploying fully ready for combat the moment they debark at their location, *leaving it to the supply system to follow up with the nice-to-have type items when the force is established* on the ground at its destination.

Repair parts resupply is the key to sustaining the heavy force. The 24th Infantry Division's efforts in this regard were probably the most successful in the theater. Key to their success was an aggressive effort that had DISCOM liaison personnel permanently posted at the APOE (Daharan International Airport) to pick up visibility, and help ensure timely delivery, of all 24th ID supplies. The DISCOM's effectiveness had an unforeseen side-effect though - - as units within the division saw how effective and responsive the supply system became, unconstrained by any budgetary considerations, their appetite for supplies of all types grew, and the volume of resupply into the division became staggering.

A considerable amount of "unresourced missions" were assigned to the DISCOM. They were "unresourced" in the sense that personnel authorizations on unit tables of organization specifically for these missions, or in some cases even mention of these tasks in doctrinal publications, is lacking. These missions included operation of retail and wholesale PX operations in the division area (PX facilities in Dammam/Daharan were inaccessible to the average soldier), operation of roadside (maintenance) spot checks as part of the division safety program, maintenance of operational readiness float vehicles, the depot-level repair of M-1 tank engines, assistance with distribution and handling of mail, creation and operation of a central issue facility for field gear, etc. Each of these missions are important, and the DISCOM is the logical unit to do them. However, executing them without having personnel

authorized in the organization to do so requires diversion of personnel from other functional areas that are often under-resourced themselves. The system for establishing personnel authorizations (at the Department of Army level) seems to be focused on authorizing the absolute minimum required to do the jobs outlined in doctrinal publications, without realizing and accepting that wartime often creates situations and missions not envisioned in any doctrinal publication.

Other significant lessons discussed in the videotape for this phase are:

1) A switch to JET A-1 fuel in the first month of the deployment caused significant problems - - hotter burning engines (which in turn developed leaks where there had heretofore been none), less miles per gallon, fouling of injectors and injector pumps from fungus (that naturally grows in diesel fuel tanks) that was broken loose by this thinner kerosene-like fuel, inability of tanks to use on-board smoke generators, lack of jet fuel purity testing capability, etc.

2) Logistics automation (ULLS, SARSS, SAMS, etc.) does work; it is not just a garrison tool to be used only in peacetime. However, computers must be protected from heat and sand/dust. Tents are not enough; air-conditioned vans, especially at support units where the loss of a computer will affect an entire brigade or more, are a necessity.

3) The Division Commander's "no-ice" policy was an unpopular one, but it took an enormous burden off the DISCOM (who previous to such a policy expended a considerable amount of logistics energy to get ice to units throughout the division, only to have most of it melt before the troops got its benefit).

4) Forklifts are the life-blood of a logistics unit. Commanders should treat them as

pacing items. Often, reliance on commercial rental forklifts in the tight quarters of peace-time garrison locations allows units to forget about and not exercise/maintain tactical forklifts. Due to the outstanding infrastructure in and around the Dammam/Daharan area, local purchase of forklift parts was very effective. Nonetheless, probably every supply unit in theater would argue that they had insufficient forklifts.

5) Announcement and authorization for use of Force Activity Designator I needs to be broadcast more clearly, top down.

6) Area support works and makes sense. No unit assigned or attached to the division had to drive past a logistics unit to get support.

7) Given the volume of supplies with which the DISCOM's supply companies deal, and the Army's inability to properly man them using current manpower authorization criteria, augmentation of them by DMMC property book personnel in wartime is an effective technique.

8) Logistics units must preserve the trafficability of the supply point. The consequence of not doing so is to suffer huge inefficiencies in support operations (as work periodically comes to a standstill while trucks are recovered out of the sand/mud).

9) Backhaul and throughput to the BSAs (by EAD units delivering supplies to the division) is sound logistics doctrine, but EAD units were ineffective in making this work. As a result, DISCOM units consumed an enormous amount of time, effort and trucks as they did their own backhaul, and offloaded materiel only to immediately reload it onto their own trucks to deliver it to the BSAs.

10) Doctors (MDs) were not put in command of medical companies, as is doctrinal,

mostly because of their unfamiliarity with the medical companies to which they were assigned (mentioned earlier). The Medical Service Corps captains in command of the medical companies worked well with their assigned Mds; there was never a problem.

11) Corps laundry and bath units were ineffective (only one platoon was provided to support the entire division), as was contract laundry. The most effective solution was soldiers washing their own clothes and using make-shift showers (the SENATOR chemical decontamination apparatus was very effective for this purpose).

12) Support battalions will handle and issue A-rations, B-rations, MREs, MOREs, and all manner of supplements, regardless of how resourced with personnel by TOE.

13) Effective field sanitation training and practices kept disease-non-battle injuries to the lowest level of any war in our nation's history. Food bought off the local economy, and A-rations provided by the Saudi government, were the biggest threat.

14) An active effort to maintain good relations with local emirs proved very beneficial, especially when access to existing wells in the area was required.

Movement to Pre-Attack Assembly Areas & Preparation for the Attack

As the division shifted 500 kilometers west into pre-attack assembly areas, all units were faced with the problem of having built up an assorted amount of supplies and equipment in their DESERT SHIELD assembly areas. This is a natural phenomenon that gets more pronounced the longer a unit remains in one location. It is especially true of support units. Since the DISCOM knew that it was neither possible nor desirable to attempt to keep these supplies and equipment with it as it transitioned to the offense, a decision was made to

simply leave all that the DISCOM did not intend to take across the line of departure (LD) in the DESERT SHIELD locations, consolidated and under guard of small detachments of soldiers. Then, when the DISCOM ended up waiting in its pre-attack positions for about 30 days after it had arrived in them, this problem occurred again (albeit on a smaller scale), and was dealt with in the same manner (leaving a small force behind to guard it). This proved a very effective technique, and considerably eased the burden of relocation of DISCOM units. In a similar effort, a Corps Support Group (CSG) maintenance company was assigned the mission of accepting and appropriately disposing of any vehicles not operational as the division crossed the LD; this allowed the DISCOM and the remainder of the CSG to focus all their maintenance effort and forces forward in full support of the offensive.

During this phase, the DISCOM was provided an enormous boost by the responsive support provided by the commander of the CSG in support of the division, and the support provided by the commander of LOGBASE "C" nearby. Mentioning this is more than just a statement of what was; it is intended to emphasize the multiplier effect that a support unit commander's attitude can have on the overall success of the unit being supported. Colonel Ross Leidy, a reserve officer who was the commander of the CSG, made a tremendous contribution to the effectiveness of both the CSG and the DISCOM when he co-located his operations center with the DISCOM's, and co-located his support battalions near DISCOM support battalions. This allowed for unity of command and unity of effort, made area support more efficient, allowing the DISCOM and CSG battalions to compliment one another, and allowed the CSG to insert itself into the division communications architecture (see Appendix II for a more detailed discussion of the DISCOM/CSG command and control

relationship). Colonel Leidy's totally unselfish and "the-answer-is-yes, what's-the-question?" attitude pervaded his entire organization; Colonel Al Sullivan (commander of LOGBASE "C") was similarly helpful.

The prioritization of the support effort received a big boost from the Division Commander in the division-level rehearsal immediately before crossing the LD. Logically, he announced the logistics priorities as ammunition, fuel and repair parts, in that order. Furthermore, his declaration to his subordinate commanders that the DISCOM would be carrying few rations, a very limited amount of water, no construction/barrier materials, etc. allowed the DISCOM to make such decisions as leaving the entire missile maintenance company for the second lift of the MSB (recalling that the MSB is 50% mobile), and using the missile company tractors to pull commercial fuel tankers; loading every truck in an attached construction engineer company with engines and transmissions for combat vehicles, rather than the construction/barrier material they had been carrying; etc. This ability to correctly prioritize was to become especially critical since the rapidity with which the division advanced against the enemy made it impossible to go back and get the second lift of the MSB.

Weapons system replacement (of initial anticipated losses) was to be conducted by platoon. To accomplish this, two fully equipped mechanized infantry platoons and a tank platoon, with soldiers taken as a unit from USAREUR units that did not deploy to SWA, were provided to the DISCOM. This was a slight departure from normal weapons system replacement operations (WSRO) doctrine, in which equipment is shipped in to the DISCOM as a result of losses and married up (under the direction of the DISCOM) with replacement

personnel from the division replacement detachment. The advantages of the approach used by the 24th ID during DESERT STORM should be readily apparent - - platoon leaders of these WSRO platoons had their platoons intact, complete with a chain of command that had trained and operated together in peacetime. The concept was that, instead of providing replacements piecemeal to units that experienced losses, replacement would be conducted by unit. Given the relatively few losses experienced during DESERT STORM, only one of these platoons was "issued" in this fashion; nonetheless, this was a significant improvement in the application of WSRO doctrine.

Other significant lessons discussed in the videotape for this phase are:

1) Establishing a cache of critical supplies (fuel, rations, water, etc.) near what eventually became the division's pre-attack assembly areas, before division units began their move, eased the immediate support burden that ensued once division units began to arrive in their pre-attack assembly areas. It also helped the DISCOM get a head start on building up a base of supplies in these locations.

2) Again, use of a local well, through mutual cooperation with and the approval of the local Saudi emir, proved to be a very effective means of meeting the division's water requirements.

3) Logistics rehearsals (within the division) were employed heavily during this phase, and provided a very effective means of ensuring that subordinate commanders understood their mission, and knew how it related to the missions of the other logisticians in the division area of operations.

4) Establishment of a C-130 landing strip right on the highway (Tapline Road) not far

from the DSA, by the theater logistics command, was a significant help in speeding the flow of ALOC resupply from CONUS to the units in the surrounding area.

DESERT STORM Operations

In an effort to overcome the problem of accurately navigating across over 300 kilometers of desert terrain (with virtually no terrain features to aid in navigation), the division established just three combat trails (which eventually would become MSRs) up which all units would travel. Engineer units traveled immediately behind the leading elements of the assaulting force, emplaced markers with grid coordinates on them (obtained from global positioning systems they were carrying) and did hasty improvements of the trail as required. The markers were a combination of florescent aircraft panels that could readily be seen several hundred meters away during the day, and blinking yellow lights so that the markers could be seen at night. It was division policy that all initial movement up the trails would be under the command of a lieutenant colonel; while this made for long convoys, it helped ensure tight command and control during a very hectic time.

The DISCOM and CSG moved up each combat trail in concert with one another, in packages in accordance with the DISCOM movement order. The DISCOM/CSG leapfrogged forward through a series of successive DSAs and Forward Operating Bases (FOBs; simply an echeloning forward of critical support, such as ammunition, fuel and medical support). This technique was probably THE reason that fuel was, for the most part, where it was needed, when it was needed, throughout the 100 hours of ground combat, which allowed the division to accelerate the phases of its attack plan to take advantage of the success being experienced

against the enemy. When possible, DSAs fell in on top of FOB sites. Each DSA/FOB site was specified in the division operations order, with location, opening and closing time; each location was planned to coincide with the location of a division signal battalion communications node.

In peacetime training, logisticians often learn that setting up logistics operations in built-up areas is advantageous (road networks are good, some logistics infrastructure may exist, etc.). However, during offensive operations such as this, when support areas will be established on what was once enemy terrain (when doing map reconnaissance of areas that might be good support areas), it would be best to ask first whether or not the proposed site had been an air target. The DISCOM's decision to fall in on top of Jalibah airfield and make that into a DSA turned out to be completely inappropriate, as there was all manner of bombs and other unexploded ordnance lying all over the airfield and its associated facilities.

Other significant lessons discussed in the videotape for this phase are:

1) Dedication (by order of the Division Commander) of a UH-60 for use by the DISCOM commander significantly improved the effectiveness of command and control of the DISCOM, and allowed it to respond quickly to the needs of a rapidly changing tactical situation.

2) Combat configured loads (CCLs) of ammunition were used very effectively for ammunition resupply. However, instead of having CCLs dropped at ammunition transfer points in support areas, they (with the trailers' tractors still attached) were kept with the support battalions, as each moved north behind the attacking elements of the division. This kept ammunition always immediately available, and should be made doctrine for offensive

operations. Because the division quickly got ahead of its battle plan, and, not wanting to sacrifice the initiative, stayed there, these CCLs (with tractors still attached) remained with the DISCOM throughout the war. While this violated doctrine and wreaked havoc with transportation plans for use of these assets, there was really no other way to do it.

3) Not changing frequencies and call signs (only possible when the enemy's electronic warfare capability is such that it is not necessary) improved the ability of units to talk to one another.

4) Transportation units would be more effective if given mission-type orders, allowing their organic chain of command to execute them as units. Consolidating assets into pools diminishes the transportation unit commander's ability to direct his/her unit's execution of their orders, and loses the synergistic effect of the teamwork that occurs when units execute missions as units who have trained and operated together.

5) Once again, use of existing wells (in Iraq) proved to be an excellent source of raw water from which to make purified water. For some reason, the arsenic content of the Euphrates river exceeded levels allowable to use it as a raw water source.

6) POW/refugee support requirements can be considerable, especially in a case where an enemy is quickly overwhelmed. There was a natural reluctance to consume DISCOM trucks for backhaul of POWs, especially given how long the MSR back to POW holding areas in Saudi Arabia had become. Iraqi dump trucks abandoned at a nearby construction site proved an excellent source of POW transportation.

7) Though there are advantages to keeping the scarce HET assets of the DISCOM/CSG consolidated, there are nonetheless advantages to allocating them to subordinate DISCOM

units, especially in the offense, when FSB non-roadable assets (eg. forklifts, cranes, etc.) must move quickly, or when moving over great distances during which time there is concern for keeping tight control over non-operational equipment.

8) Air resupply to the heavy division is best left to high payoff/low tonnage items of supply. One should never waste air resupply assets trying to move fuel or tank ammunition forward - - it is impossible to move enough by air to make a difference; however, resupply of a few HELLFIRE or Copperhead rounds by air to meet a specific unforecast demand would be completely appropriate. Air resupply was facilitated by pre-planning expected loads (eg. emergency resupply of water to isolated units via 500 gallon water bags, a chemical decontamination package containing all that would be required to decontaminate an entire company of soldiers, etc.), and by leaving a large team of soldiers specially trained in sling load operations at what was the pre-attack position in Saudi Arabia (near the supplies left behind).

Retrograde Operations, Consolidation & Redeployment

The retrograde of the division out of Iraq included a substantial amount of equipment that was by that time unable to return under its own power to the consolidation area back in Saudi Arabia, and that could not be repaired before the move was to begin. As might be expected, no allied equipment that could ever be used by the Iraqi armed forces in the future was permitted to be left behind in Iraq. The distance and time allowed to execute the movement also made it desirable to retrograde DISCOM/CSG non-roadables (forklifts, cranes, etc.) by HET. In addition, there was a substantial amount of captured enemy

equipment that required retrograde. All this equated to a considerable requirement for HETs to assist in the movement.

Movement out of Iraq (a distance of over 350 kilometers at once) was the perfect scenario for the use of Refuel on the Move (ROM), which was executed quite successfully by EAD bulk petroleum units. This massive refueling challenge was a demonstration of an appropriate, doctrinal use of ROM (as opposed to conduct of ROM operations within the division with the limited assets of the DISCOM).

The method of ammunition turn-in was, from the division's standpoint as a redeploying unit, outstanding, and probably should be captured as THE way to do it in the future. Essentially, all ammunition not in ready racks within combat vehicles was collected and taken by the owning unit to ammunition collection points near the consolidation point to which each unit went after the retrograde out of Iraq. All ammunition contained in ready racks of combat vehicles was left there until the combat vehicle was moved via HET to the port area, where the HETs drove through a central ammunition turn-in point that had been set up nearby, enroute to the assembly area at the port to which the combat vehicle was to be taken. As HETs drove through the ammunition turn-in area, ammunition was downloaded from the combat vehicles on the HETs, without ever having to remove them from their HETs. It was a no-questions-asked turn-in, focused solely on ridding units of all their live ammunition. The ammunition supply companies operating the collection points then inspected all that was collected, classified it as to condition code, repackaged it appropriately, and eventually shipped it out of country.

The DISCOM was assigned the mission of coordinating the loading of all ships for

redeployment. This was a phenomenal task, involving over 1,000 soldiers working in shifts that could sustain 24 hours/day operations (approximately 400 involved with driving, loading & tying down vehicles aboard ship, another 400 soldiers divided into vehicle wash teams, etc.). While the DISCOM is probably the logical unit to which to assign this mission, and that would therefore be the last unit to redeploy, it had to be augmented by soldiers from within the division (done through taskings assigned in the division-level operations order issued by the G-3), so that it could also work on cleaning and preparing for redeployment of its own vehicles and equipment. There is little published in the way of a "HOW-TO" guide for conducting such a mission, nor does there need to be. The guide to successful accomplishment of such a mission is simply to execute the basic problem-solving and operations execution processes taught to all leaders - - study the mission, make a plan, assign responsibilities, etc.

Other significant lessons discussed in the videotape for this phase are:

1) Soldiers, in the euphoria of successful combat operations, will throw away personal equipment before cleaning it to the rigid agricultural standards required by the US Department of Agriculture. The 24th ID took steps to prevent this from occurring (such as posting guards at trash points, etc.), and policed up any serviceable materiel that was thrown away.

2) Also competing with the soldier's desire to get home as soon as possible was the requirement to leave Saudi Arabia at least as free from American presence as it had been before we arrived. This meant that nothing could be left in any place that division units had occupied, which is precisely what happened. This was surely helpful toward leaving the Saudis with a more positive memory of our having been there.

3) Reception at home station was first class, complete with the band playing and a cheering crowd for every planeload of soldiers. However, in the rush to reunite soldiers with their loved ones, weapons and other sensitive items were quickly collected, without the strict, by-serial-number accountability normally employed. As a consequence, it was to become difficult in the ensuing weeks to recapture 100% accountability for these items (though all weapons were finally accounted for).

The Big Picture

In retrospect, it has become clearer that it would have been enormously helpful if the theater's logisticians had met periodically, perhaps monthly, down to CSS battalion commander level. While each was well versed on his or her part of the action, few knew the overall plan, or how it all fit together. Aggressive logisticians, each concerned with getting the best they could for their customers, often acted in contra-purposes to one another. It wasn't because logisticians were being avaricious; rather, it was because they did not understand the big picture, who was doing what for whom, why rationing in some cases was necessary, and what/when the long range objectives were. For example, it has been established that almost four times the amount of ammunition required for a 60 day campaign was brought into the theater, not because that was the plan, but rather, because there wasn't a clear understanding on the part of the logisticians (especially those at division-level and below) as to how each piece of the plan, and the whole, all fit together. Similar dysfunctional planning and execution occurred with bulk fuel stocks. Throughout the DESERT SHIELD, logisticians at all levels were trying to establish reserves for their units, each

without understanding the consequences of their actions on others in the theater, the critical worldwide position some stocks (eg. MREs, T-rations, etc.) were in, and without understanding the compounding effects of a division establishing reserves at division-level for all units within the division, the corps establishing reserves at corps-level for all divisions and other units in the corps, and the theater establishing reserves for all corps and other units in the theater. Without a clear understanding of who is supposed to be doing what for whom, logisticians will probably, in the next war, do the same thing they did in this one - - get all they can for the units support, as soon as they can, without regard for the short term impact that might have on the overall functioning of the support process.

CONCLUSION

In conclusion, it is probably appropriate to mention the enormous growth and learning that each of DISCOM's commanders went through. Someone once said that there is no substitute for experience - - nothing could be more true. Each of the DISCOM's commanders were experienced logisticians, with nearly one hundred years of collective experience in all manner of training exercise. However, each would admit to being challenged to physical and mental extremes, the likes of which they had never before experienced. Fortunately, the scenario was such that the learning curve of providing the division combat team's logistics in an extremely harsh environment over 7,000 miles from home had mostly flattened out by the time the shooting started. As Colonel King points out in the videotape, ..."we matured here" (in the first 90 days of DESERT SHIELD). Thereafter, confidence grew daily and the daunting mission of supporting what has been called "the greatest cavalry

charge in history"[6] actually seemed possible when that mission was assigned in November 1990. The same lessons and confidence were undoubtedly learned in other divisions as well. Logisticians of the future should remember that though the challenges may seem to be insurmountable, the basic things we have been taught, and the equipment we have been provided, do work. It is important that all fully get their heads into the game each time that training is conducted during peacetime, even if the best that we can afford is a simulation or command post exercise for leaders. Fundamentally, the real key to success of the logistics operators was their determination, innovation and leadership skill, at all levels, beginning at the squad/section leader. To reinforce that point, a quote from the commander of the 24th ID DISCOM, from the 11 March 1991 issue of US News & World Report, is appropriate:

. . ."You have to be flexible and innovate; some doctrine works, some doesn't". . .[7]

This videotape has hopefully provided some insight into some of the unexpected that will further prepare those who follow to perform equally well.

APPENDIX I

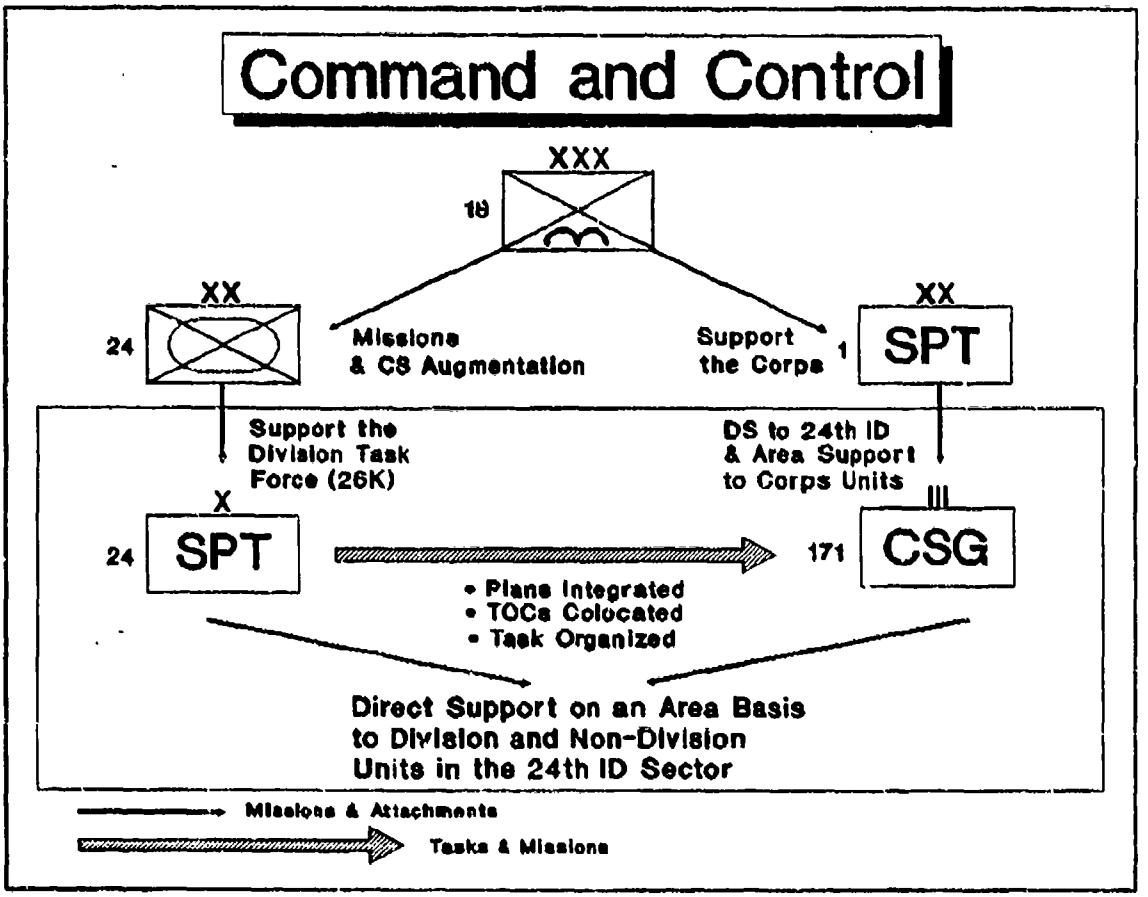
SURFACE MOVEMENT

Vessel Name	Arr Savannah	Dep Savannah	Arr Dammam	Pieces
*Capella	11 Aug 90	13 Aug 90	27 Aug 90	684
*Altair	11 Aug 90	14 Aug 90	28 Aug 90	804
*Bellatrix	12 Aug 90	15 Aug 90	1 Sep 90	930
*Regulus	14 Aug 90	16 Aug 90	31 Aug 90	980
*Algol	15 Aug 90	17 Aug 90	5 Sep 90	876
*Antares	16 Aug 90	19 Aug 90	23 Sep 90**	802
Inscription	16 Aug 90	20 Aug 90	9 Sep 90	708
*Denebola	19 Aug 90	22 Aug 90	7 Sep 90	768
Hudson	19 Aug 90	22 Aug 90	16 Sep 90	768
Cygnus	24 Aug 90	25 Aug 90	11 Sep 90	444

* Fast Sealift Ship (FSS)

** The USNS ANTARES broke down at sea, shortly after departure from the port of Savannah. Attempts to repair it at sea failed. It was eventually towed to Rota, Spain, where its cargo was transloaded onto the USNS ALTAIR, which was on its return trip back to the United States from Saudi Arabia. The ANTARES never did arrive in Saudi Arabia with 24th Division equipment loaded on it. It would be inaccurate to use the ALTAIR's second landing at Dammam on 23 September (as a measure of when the division's last ship "closed" in Saudi Arabia) in computing the time it takes to deploy a heavy division to SWA. Most significant about the delay in getting the ANTARES' cargo to Dammam was the fact that the majority of the MSB's equipment, including the entire Class IX Common Main ASL (nearly all the repair parts in the division), and almost the entire DISCOM HHC/DMMC (including the division's main logistics computer van and most of the DMMC's management data/mini-computers) was aboard it.

APPENDIX II



The diagram above depicts the command and control relationship agreed to between the 24th Division Support Command (DISCOM), and the 171st Corps Support Group (CSG), which operated in support of the 24th Division. Technically, the CSG was a subordinate command of the 1st Corps Support Command, 18th Airborne Corps, and was doctrinally responsible to support all non-divisional Corps assets within the 24th Division's area of operations, as well as to provide back-up support to the division. The 24th Division was assigned its missions by Headquarters, 18th Airborne Corps, and had been augmented with a considerable amount of combat and combat support units (eg. artillery, engineer, etc.); the division task force grew to a strength of over 26,000 soldiers (and would grow even larger at times during DESERT STORM). Colonel Ross Leidy, commander of the 171st CSG, agreed with the 24th Division's DISCOM commander that the most effective means of ensuring responsive support to the units operating in the 24th Division area of operations was to combine the CSG with the DISCOM, and provide area support to the force. Colonel Leidy thus completely integrated his plans with the DISCOM's, collocated his operations center with the DISCOM's, and allowed his units to be task-organized into/with the DISCOM. This proved to be a very effective means of operation.

APPENDIX III

VIDEOTAPE TOPICAL OUTLINE

INTRODUCTION RUNTIME: 5:10

I. ALERT/PRE-DEPLOYMENT RUNTIME: 30:00

A. Initially, believed only one reinforced BDE (2nd BDE) would deploy
B. Timing of the deployment (given one BDE returning from NTC/one AR BN in the midst of a COHORT deployment/PLLs not replenished due to end of FY constraints, etc.)
C. Deployability of soldiers
D. Alcohol was put off-limits starting the day of the alert
E. State of common skills/unit training of PROFIS physicians
F. DISCOM's receipt, storage & issue of maps mission
G. Deployment multiplier of 20' MILVANs
H. Knowledge/use of "operational project stocks"
I. Handoff of support missions to stay behind units/activities at the last minute
J. Rentals (communications devices, commercial vehicles, etc.) at Fort Stewart
K. Twice/day update for CG, BDE & BN CMDRs
L. Consolidating all non-deployables; family support groups
M. Reduction in mobility when carrying ammunition basic load (not enough trucks!)
N. Left behind what did not fit on unit trucks
O. Magnitude of materiel flowing in to Fort Stewart
P. Local purchase can be a BIG help
Q. Training between time (two weeks) ships are loaded and air movement begins

II. STRATEGIC DEPLOYMENT RUNTIME: 13:35

A. What we put on ships; requirement to deploy a heavy division (11 FSS vs. 8)
B. LOGMARS/AUEL/TC-ACCIS
C. Super-hydration; requirement for leaders to eat regularly
D. Two biggest initial problems in Saudi Arabia were lack of communications gear & vehicles (for command & control)
E. Hand-carrying computers/medical sets
F. Shackles/tires/damage to fuel tankers

III. MOVEMENT TO INITIAL POSITIONS RUNTIME: 22:55

A. Effects of not having any EAD units in country
B. DISCOM commanders' experience (NTC/REFORGER)
C. Jumping the DSA
D. Use of MILVANs & the need for Rough Terrain Container Handlers (RTCHs)
E. Operating in extreme heat

F. Civilian fuel tankers & an unforeseen requirement for international couplings

IV. **BUILD-UP AND PREPARATION FOR THE DEFENSE** RUNTIME: 46:05

A. Water (contracting for bulk water tankers, use of existing wells, ROWPUs, and use of bottled water)
B. FSBs operating without field trains in DESERT SHIELD assembly areas
C. Things units did not deploy with
D. Repair parts resupply/volume
E. Switch to JET A-1; requirements for fuel testing
F. Logistics automation worked
G. "no-ice" policy
H. Forklifts the life-blood of logistics units; need more; use of local purchase to support
I. Authorization for use of Force Activity Designator I
J. Area support works and makes sense
K. How to use the DMMC PBO section in wartime
L. Preserving the trafficability of the supply point
M. Backhaul & thruput to BSAs (by EAD units) not effectively employed
N. Mds did not command medical companies
O. Insufficient quantity of laundry & bath units
P. Unresourced missions
Q. Class I (types of rations utilized)
R. Effective field sanitation kept DNBI to absolute minimum
S. Good relations with local emirs helpful (especially with regard to use of wells)

V. **MVMT TO PRE-ATK ASSY AREAS & PREP FOR ATK** RUNTIME: 11:15

A. Great support from & working relationship with the Corps Support Group & nearby LOGBASE "C" Commander (providing responsive, helpful support starts with the attitude of the commander)
B. Prioritization of the support effort
C. Weapons System Replacement Operations (WSRO)
D. Cache'ing supplies in pre-attack positions before units arrived
E. Logistics rehearsals
F. C-130 landing strip near Division Rear Area (on Tapline Road)

VI. **DESERT STORM OPERATIONS** RUNTIME: 16:55

A. Marking of MSRs
B. DISCOM/CSG moved in packages; use of "Forward Operating Bases" (FOBs)
C. Enemy airfields (eg. Jalibah) unsafe for CSS operations
D. DISCOM Commander's use of UH-60 for command & control
E. Use/value of CCLs
F. Not changing frequencies/call signs

G. Command & control of transportation units
H. Once again, use of existing well (in Iraq)
I. POW/refugee support requirements considerable
J. HETs allocated to FSBs for movements
K. Air resupply - reserved for high payoff/low tonnage items of supply

VII. RETROGRADE OPS, CONSOL & REDEPLOYMENT RUNTIME: 8:30

A. Retrograde HET requirements
B. ROM on movement out of Iraq
C. Ammunition turn-in
D. Port Support Activity (PSA) operations
E. Soldiers will throw away their equipment (rather than clean it) in rush to get home
F. Left Saudi Arabia cleaner than we found it
G. Home station weapons control (upon arrival back at Fort Stewart)

CONCLUSION: We matured . . . RUNTIME: 5:00

ENDNOTES

[1]It is not mentioned in FM 100-17, dated 28 October 1992.

[4]Navy Fact File, Ninth Edition, Department of the Navy, Office of Information, October 1987, III-33.

[3]The movement of the Antares is not included in this statement. As is described in Appendix 2, this ship broke down at sea and never did make it to SWA, its cargo being transloaded to another ship at Rota, Spain.

[4]Annual (Secretary of Defense) report to the President and the Congress, January 1993, p. 102.

[5]Defense Transportation Journal, December 1991, pages 19 - 38.

[6]Joseph L. Galloway,"The Point of the Spear," US News & World Report 110, no. 9 (March 11, 1991): 32.

[7]Ibid: 41.